

# **LEAD-FREE SOLDER STRUCTURE AND METHOD FOR HIGH FATIGUE LIFE**

## **Abstract of the Disclosure**

A method and structure for solderably coupling an electronic module (e.g. a ceramic or plastic ball grid array module) to a circuit board. A lead-free solder ball is soldered to the  
5 module without using a joining solder to effectuate the soldering. The solder ball comprises a tin-antimony alloy that includes about 3% to about 15% antimony by weight. The solder ball is soldered to the circuit board with a lead-free joiner solder. The joiner solder comprises a tin-silver-copper alloy that includes by weight about 95.5-96.0% tin, about 3.5-4.0% silver, and about 0.5-1.0% copper. The resultant solder connection between the module and the circuit board has a fatigue life of at least about 90% of a fatigue life of a reference structure. The  
10 reference structure has a 90Pb/10Sn solder ball joined to both the module and the circuit card by a 63Sn/37Pb joiner solder.